ONTARIO MINISTRY OF ENVIRONMENT
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1970

OPERATING SUMMARY

BRANTFORD

water pollution control plant

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ONTARIO WATER RESOURCES COMMISSION

ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

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Brantford : water pollution
control plant.

81598

Water management in Ontario

Ontario
Water Resources
Commission

135 St.Clair Ave.W.
Toronto 195
Ontario

Once again we have the privilege of submitting to you our latest detailed report on financial progress and technical activity at your water pollution control plant.

The statistical information contained in this annual operating summary will undoubtedly be a useful barometer of efficiency. Of particular interest will be the comments and recommendations of the regional operations engineer, who was intimately connected with day-to-day operation throughout 1970.

Together with the extensive cost data provided, this information should assist greatly in your general understanding of the problems met and dealt with, and in furnishing a yardstick for possible future expansion.

D.S. Caverly,
General Manager.

DMcTavish

D.A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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135 St. Clair Avenue West
Toronto 195

BRANTFORD
water pollution control plant

operated for

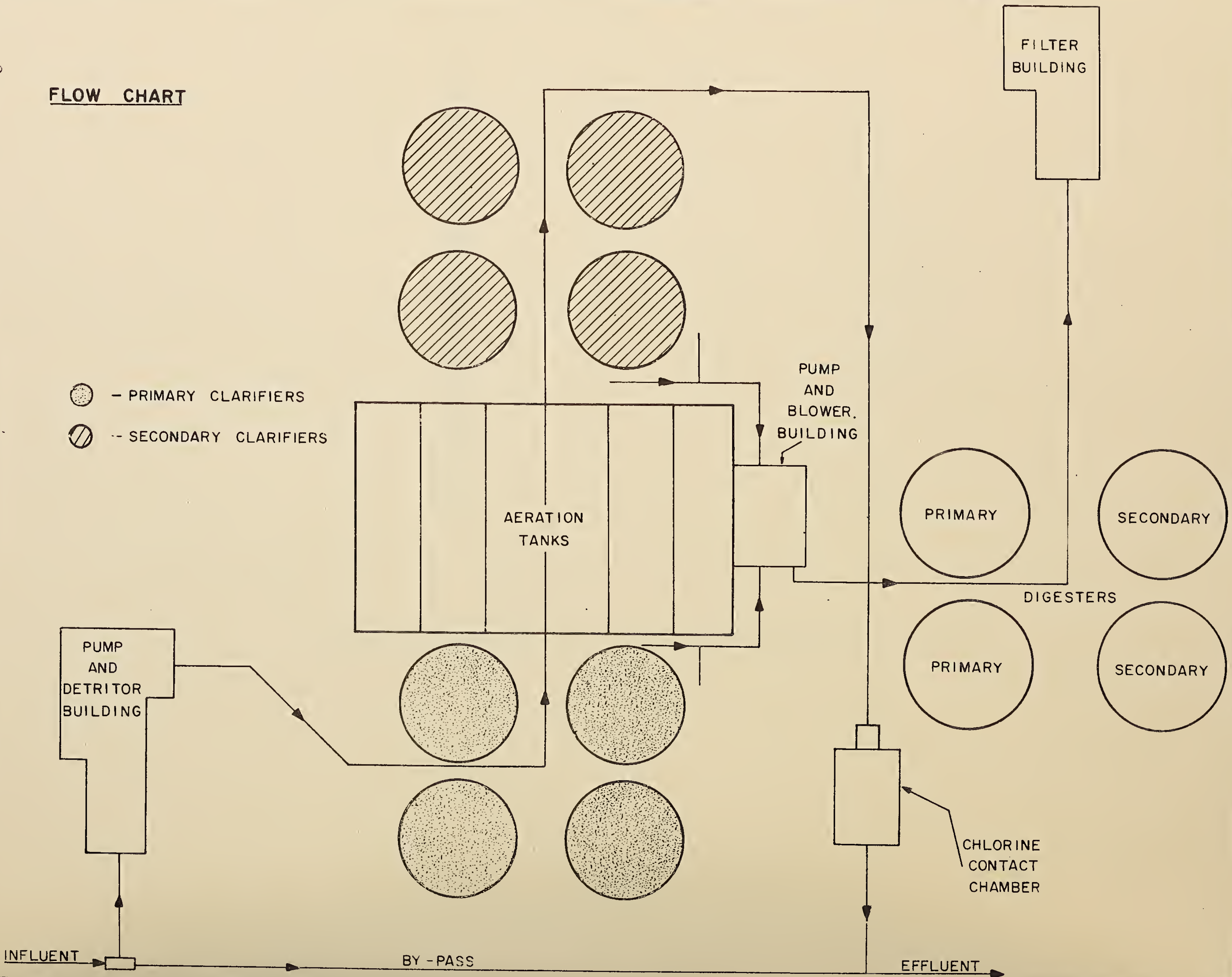
THE CITY OF BRANTFORD

by the

ONTARIO WATER RESOURCES COMMISSION

1970 ANNUAL OPERATING SUMMARY

FLOW CHART


– PRIMARY CLARIFIERS
-- SECONDARY CLARIFIERS
FILTER BUILDING
PUMP AND BLOWER. BUILDING
AERATION TANKS
PRIMARY
PRIMARY
SECONDARY
SECONDARY
DIGESTERS
PUMP AND DETRITOR BUILDING
CHLORINE CONTACT CHAMBER
INFLUENT
BY-PASS
EFFLUENT

DESIGN DATA

PROJECT NO.	2-0011-58	TREATMENT	Activated Sludge
DESIGN FLOW	12.5 mgd	DESIGN POPULATION	65,000
BOD - Raw Sewage	170 mg/l	SS - Raw Sewage	175 mg/l
- Removal	90%	- Removal	90%

PRIMARY TREATMENT

Screening

Type: Coarse bar screens
Size: Two 5-in. spaces

Comminution

Type: Infilco Rotogrator
Size: Two No. 43 (8 mgd ea)

Raw Sewage Pumps

Type: Fairbanks-Morse
Size: Four 3840 gpm ea @ 45' tdh

Grit Removal

Type: Dorr Detritor, Type WA
Size: Two 20' x 20' x 1'-3"
Flow Velocity: 1 fps
Retention: 0.725 min

Primary Sedimentation

Type: Eimco, Type C
Size: Four 70' dia x 10' swd
Retention: 2 hours
Loading: Surface, 812 gal/ft^2/day
Weir, 14,200 gal/ft/day

SECONDARY TREATMENT

Aeration Tanks

Type: Diffused air; triple pass
(Two tanks)
Size of pass, 200' x 30' x 15'
Retention: 7.5 hr

Air Supply

Type: Sutorbilt blowers
Size: Three 4300 cfm

Air Diffusers

Type: Spargers
Spacing: 144 per pass @ 16½" centres
Total: 864

Secondary Sedimentation

Type: Eimco, Type C
Size: Four 70' dia x 10' swd
Retention: 2 hr
Loading: Surface, 812 gal/ft^2/day
Weir, 14,200 gal/ft/day

CHLORINATION

Chlorinator

Type: Fischer & Porter
Manual adjustment - liquid chlorine
evaporator

Chlorine Contact Chamber

Size: 51' x 18' x 7'
Retention: 5 min

OUTFALL

Grand River

SLUDGE HANDLING

Digestion System

Type: Two-stage
Primary -- Two 55' dia tanks with two
D-O-L mixers each
Volume 49,300 cu ft or 300,000
gal (each tank)
Loading 6.1 lb/ft^3/mo
Secondary--Two 70' dia tanks with Dorr
floating covers
Volume 97,200 cu ft or 600,000
gal (each tank)
Total Loading: 2.0 lb/ft^3/mo

Vacuum Filter

Type: Komline-Sanderson coil filters
Size: Two 350 sq ft filters

'70 REVIEW

GENERAL

Sludge disposal by land application of liquid digested sludge on City-owned land near the plant has resulted in considerable savings to the project. The previous method of vacuum filtration and land disposal of filtered sludge was $2\frac{1}{2}$ to 3 times more costly.

Plans and specifications for the modifications to the aeration section and return sludge facilities have been prepared by the Commission's consulting engineers. It is anticipated that construction will be started and completed in 1971.

Sections of brick cladding on one of the primary digesters collapsed in 1970. The cladding on this digester will be replaced with metal siding in 1971 by plant staff. It is anticipated that the brick work on the second primary digester will be adequate until 1972.

A new liquid sludge haulage vehicle (capacity 3,000 gallons) will be purchased in 1971. One of the two White trucks will be taken out of service and will be used as a spare parts supply for the other White vehicle.

A 20-acre section of farmland owned by Mr. R. Cameron was made available for experiments to determine the fertilizer qualities of our sludge on field corn production. Results obtained from this experiment were inconclusive as comparative yields were not determined by Mr. Cameron. Random sampling of corn cobs, however, indicated that the cobs taken from the area fertilized with digested sludge were 1 to $1\frac{1}{2}$ inches longer (and contained kernels along the full length of the cobs) than corn cobs sampled from other areas of the farm which had been fertilized with commercial fertilizer.

PLANT FLOWS and CHLORINATION

The average daily flow of 7.52 million gallons was slighly less than the average daily flow in 1969. This represents a hydraulic loading of about 60% of the plant's design capacity.

An average chlorine dosage of 2.5 mg/l was required to maintain an 0.5 mg/l residual in the effluent for a contact period of 15 minutes. This dosage was similar to the rate required for the past two years.

FLOWS	DAILY FLOW mil gal	OCCURRING IN THE MONTH OF	MONTHLY FLOW mil gal	OCCURRING IN THE MONTH OF
Average	7.52	—	229.0	—
High	9.90	April	247.5	December
Low	7.80	February	189.9	February

PLANT EFFICIENCY

The removal efficiency for BOD and suspended solids was 94% which compared with the efficiency in 1969. The effluent quality of 10 mg/l and 15 mg/l suspended solids was similar to the effluent quality in the previous year.

EXPENDITURES

The 1970 operating costs for the Brantford WPCP were $251, 542.63, or $91.52 per million gallons treated. The increase in costs over 1969 was one percent.

SLUDGE DIGESTION and DISPOSAL

A total of 11, 700, 000 gallons of raw sludge was digested in 1970 which is approximately 28% less than in 1969. The average solids concentrations of 4.4% was considerably less than the 1969 average of 5.1%. The total solids concentration in the digested sludge averaged 3.5% and was similar to the sludge concentration during the previous year.

VACUUM FILTRATION

The vacuum filters were overhauled early in the year and readied for service. However, they were not required at any time during the year.

AERATION

The mixed liquor suspended solids concentration averaged 2, 700 mg/l. The organic loading averaged 11 pounds BOD per day per 100 pounds mixed liquor suspended solids which is similar to the loading in 1969.

Low dissolved oxygen concentrations were recorded only on a few occasions and it was believed, did not contribute to any of the minor plant upsets experienced during the year.

CONCLUSIONS

Land disposal of liquid digested sludge has proven to be a very satisfactory and economical method for sludge handling.

One primary digester will be recladded in 1971. Modifications to the aeration section and return sludge facilities will be started and completed in 1971.

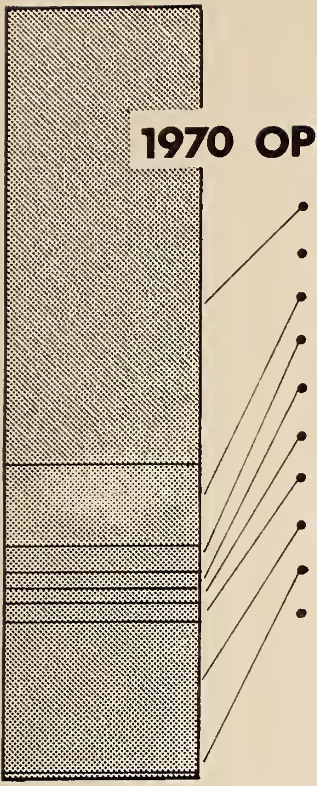
Plant loadings both hydraulic and organic were similar to those of the previous years as was the effluent quality which was very good.

PROJECT COSTS

NET CAPITAL COST (Final)	$2,250,950.02
DEDUCT - Portion financed by CMHC/MDLB (Final)	493,126.02
Long Term Debt to OWRC	$1,757,824.00
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1970	$ 623,639.14
Net Operating	$ 251,435.21
Debt Retirement	46,653.00
Reserve	13,246.76
Interest Charged	98,484.23
TOTAL	$ 409,819.20

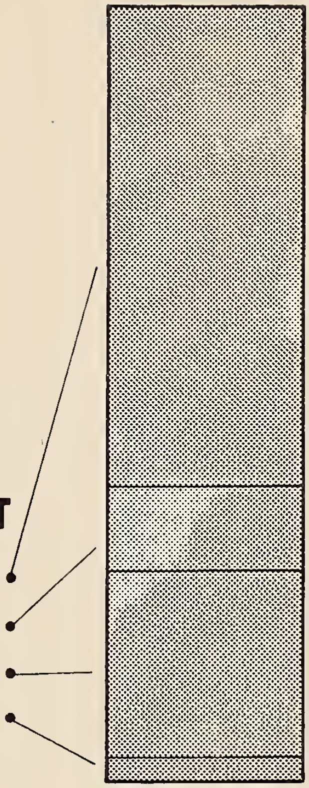
RESERVE ACCOUNT

Balance @ January 1, 1970	$ 87,131.49
Deposited by Municipality	13,246.76
Interest Earned	5,823.94
	$ 106,202.19
Less Expenditures	-
Balance @ December 31, 1970	$ 106,202.19



1970 OPERATING COSTS

PAYROLL	59 %
FUEL	< 1 %
POWER	11 %
CHEMICALS	3 %
GENERAL SUPPLIES	2 %
EQUIPMENT	2 %
REPAIRS & MAINTENANCE	3 %
SUNDRY	20 %
WATER	1 %
TRAVEL	< 1 %



TOTAL ANNUAL COST

NET OPERATING	62 %
DEBT RETIREMENT	11 %
INTEREST	24 %
RESERVE FUND	3 %

Yearly Operating Costs

YEAR	MILLION GALLONS TREATED	TOTAL OPERATING COSTS	COST PER MILLION GAL	COST PER LB OF BOD REMOVED
1966	2490	$188,867.51	$75.83	4 cents
1967	2622	226,643.20	86.44	4 cents
1968	2642	251,764.34	95.31	5 cents
1969	2782.7	254,678.50	91.56	5 cents
1970	2748.5	251,542.63	91.50	5 cents

MONTHLY OPERATING COSTS

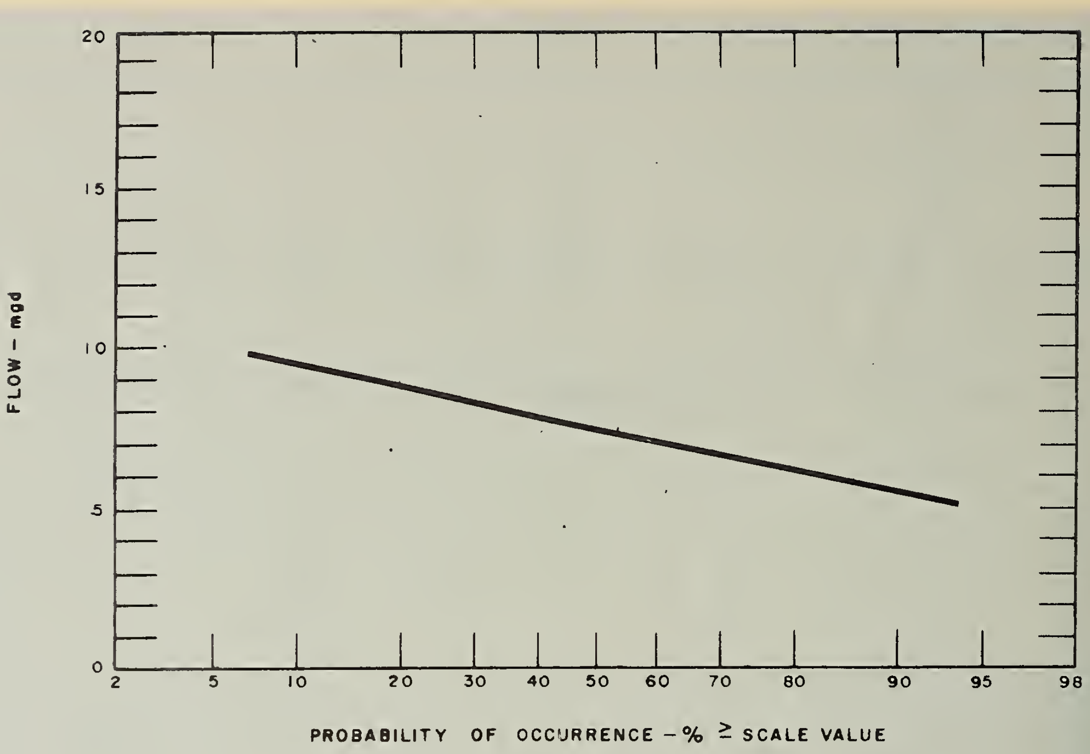
MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY *	WATER	TRAVEL
JAN	22988.52	16320.80	-	139.33	2557.30	2090.34	108.71	186.74	1235.74	62.18	287.38	-
FEB	25799.46	11497.65	-	260.01	2406.20	-	(69.79)	-	282.59	11422.80	-	-
MAR	14814.03	11458.30	-	102.75	2325.80	(190.00)	284.23	51.18	413.25	81.14	287.38	-
APR	14513.85	11372.11	-	-	2435.00	-	441.26	-	201.07	64.41	-	-
MAY	16626.54	12594.30	386.76	-	2419.40	-	165.59	-	650.57	122.54	287.38	-
JUNE	16051.93	11333.47	708.20	113.10	2481.70	-	266.14	-	801.70	347.61	-	-
JULY	31467.52	11006.39	712.57	-	2382.20	-	1063.26	-	103.07	15895.25	287.38	17.40
AUG	33788.50	16892.77	888.81	-	-	-	592.85	47.25	53.90	15312.92	-	-
SEPT	21603.30	11239.44	130.04	-	6306.80	-	361.05	147.56	388.15	2742.88	287.38	-
OCT	12572.78	11088.70	-	-	-	-	891.83	-	535.08	57.17	-	-
NOV	20583.86	11180.18	-	-	2257.20	-	585.39	-	1487.87	4707.24	287.38	78.60
DEC	20732.34	11078.59	-	230.33	2086.80	4733.40	668.47	97.93	1271.54	277.90	287.38	-
TOTAL	251542.63	147062.70	2826.38	845.52	27658.40	6633.74	5358.99	530.66	7424.53	51094.05	2011.66	96.00

BRACKETS INDICATE CREDIT

* SUNDRY INCLUDES SLUDGE HAULAGE COSTS WHICH WERE $27,230.10

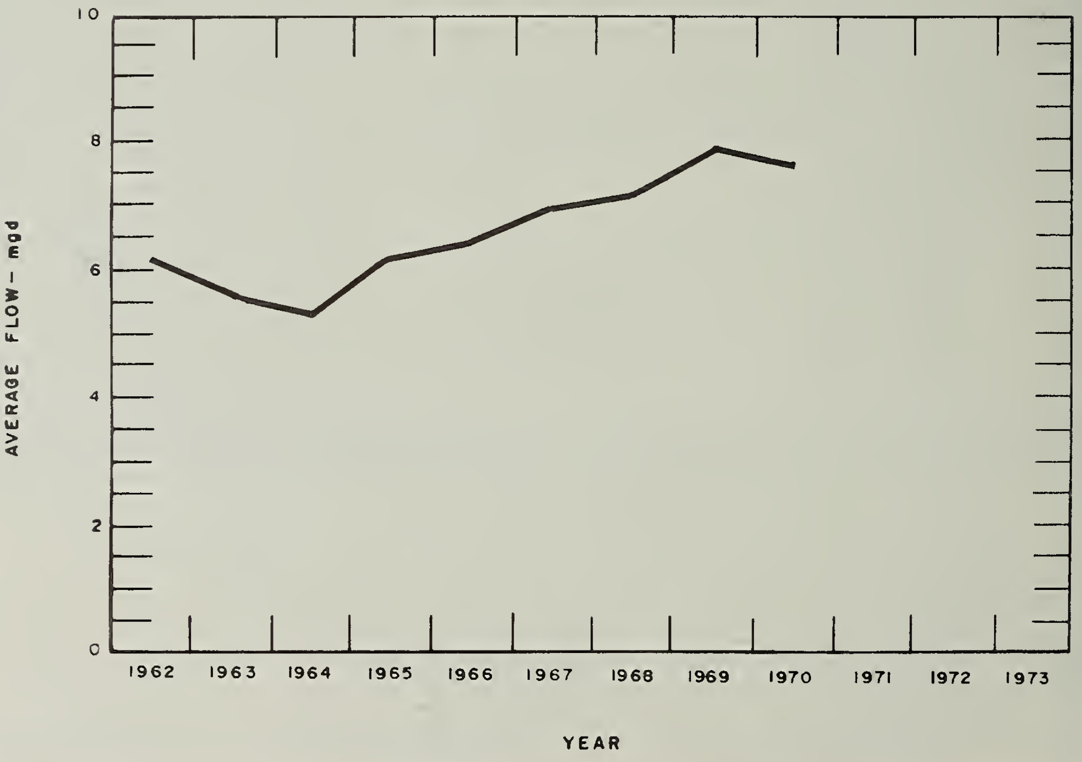
Note: Total does not include year end adjustments.

PROCESS DATA



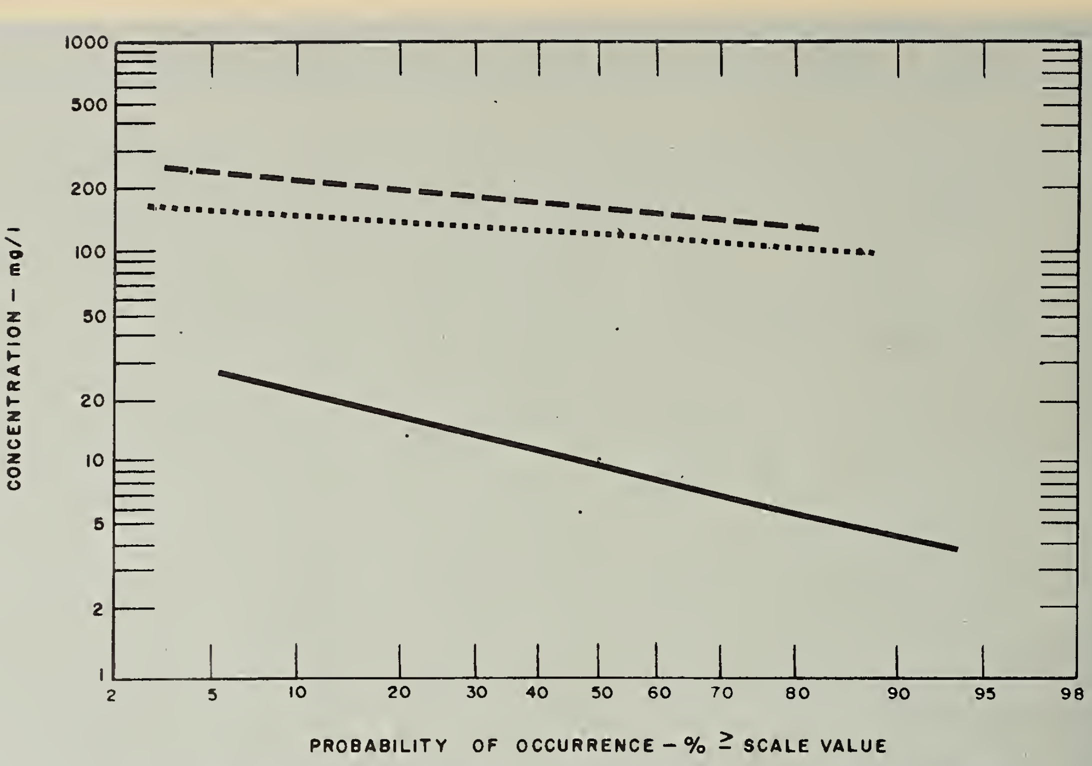
FLOWS

NOMINAL CAPACITY 12·5 MGD



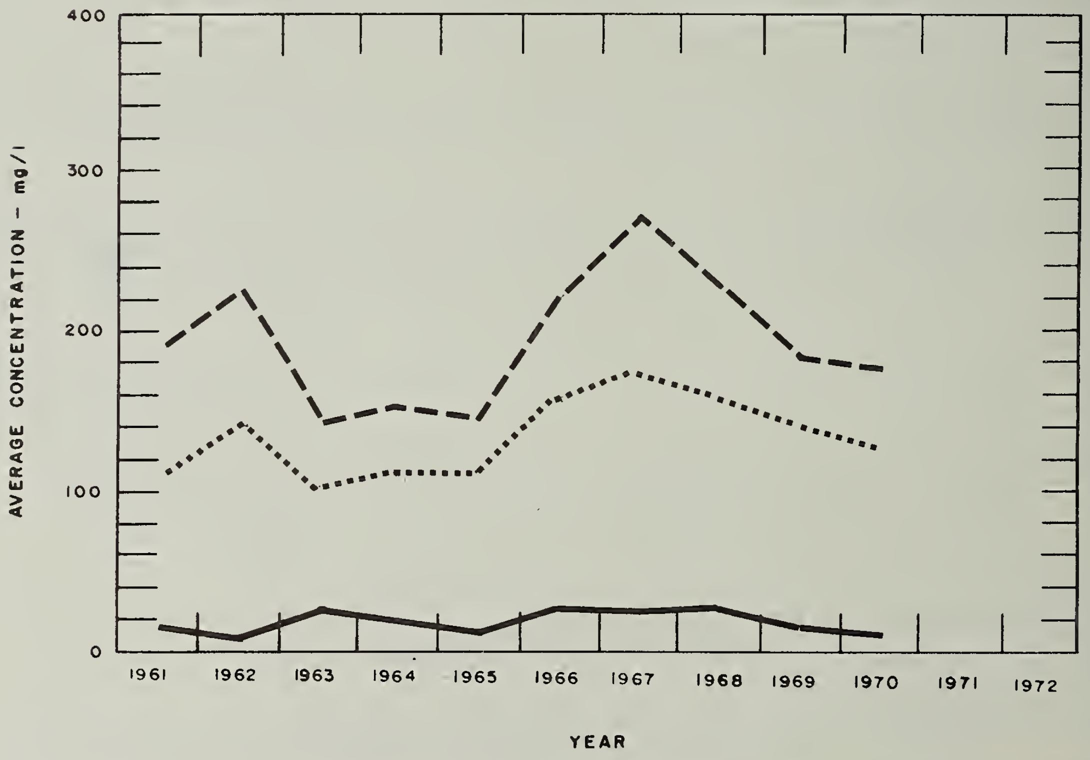
PLANT FLOWS and CHLORINATION

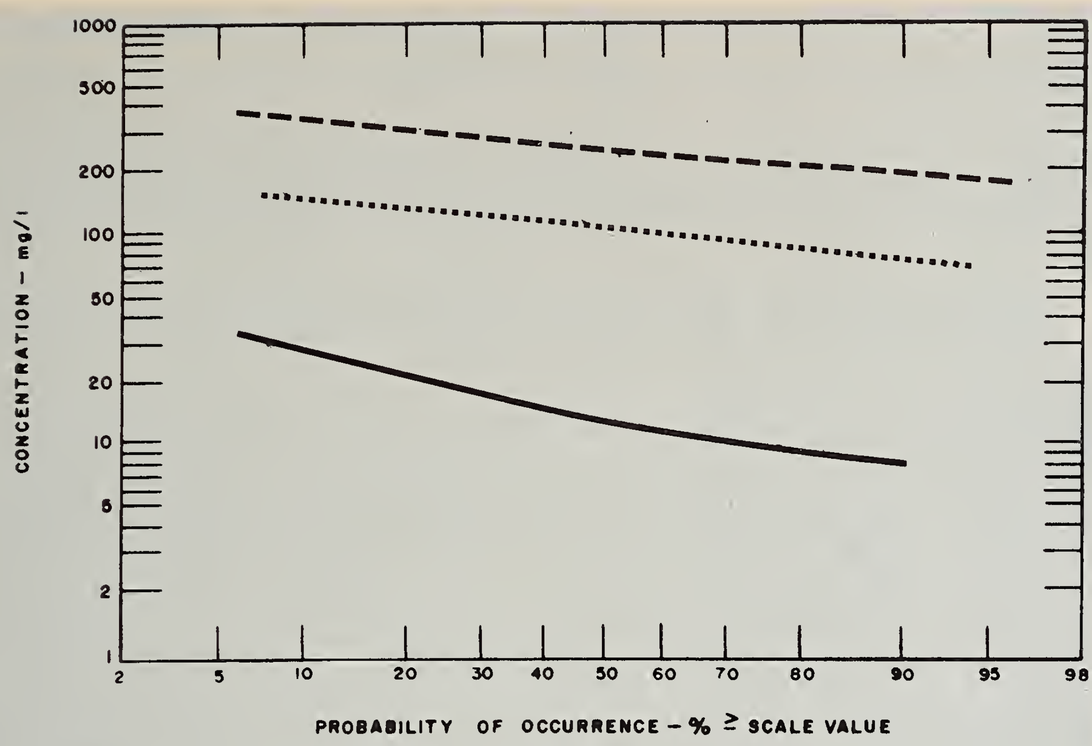
MONTH	TOTAL FLOW mil gal	AVERAGE DAILY FLOW mil gal	MAXIMUM DAILY FLOW mil gal	MINIMUM DAILY FLOW mil gal	CHLORINE USED 10^3 pounds	DOSAGE mg/l
JAN	194.5	6.28	8.1	3.9	5.6	2.9
FEB	189.9	6.78	7.8	5.4	5.1	2.7
MAR	222.2	7.17	8.8	5.4	5.3	2.4
APR	246.4	8.23	9.9	6.6	5.2	2.1
MAY	242.4	7.82	9.2	5.7	5.7	2.3
JUNE	236.1	7.85	9.2	5.6	5.5	2.3
JULY	232.0	7.48	9.3	5.2	5.5	2.4
AUG	227.8	7.35	8.9	4.5	5.4	2.4
SEPT	237.1	7.92	9.0	5.7	6.1	2.6
OCT	238.6	7.70	9.2	5.4	6.6	2.8
NOV	234.0	7.81	9.1	5.8	5.9	2.5
DEC	247.5	7.97	9.1	5.6	6.4	2.6
TOTAL	2748.5	-	-	-	68.3	-
AVERAGE	-	7.52	-	-	5.7	2.5



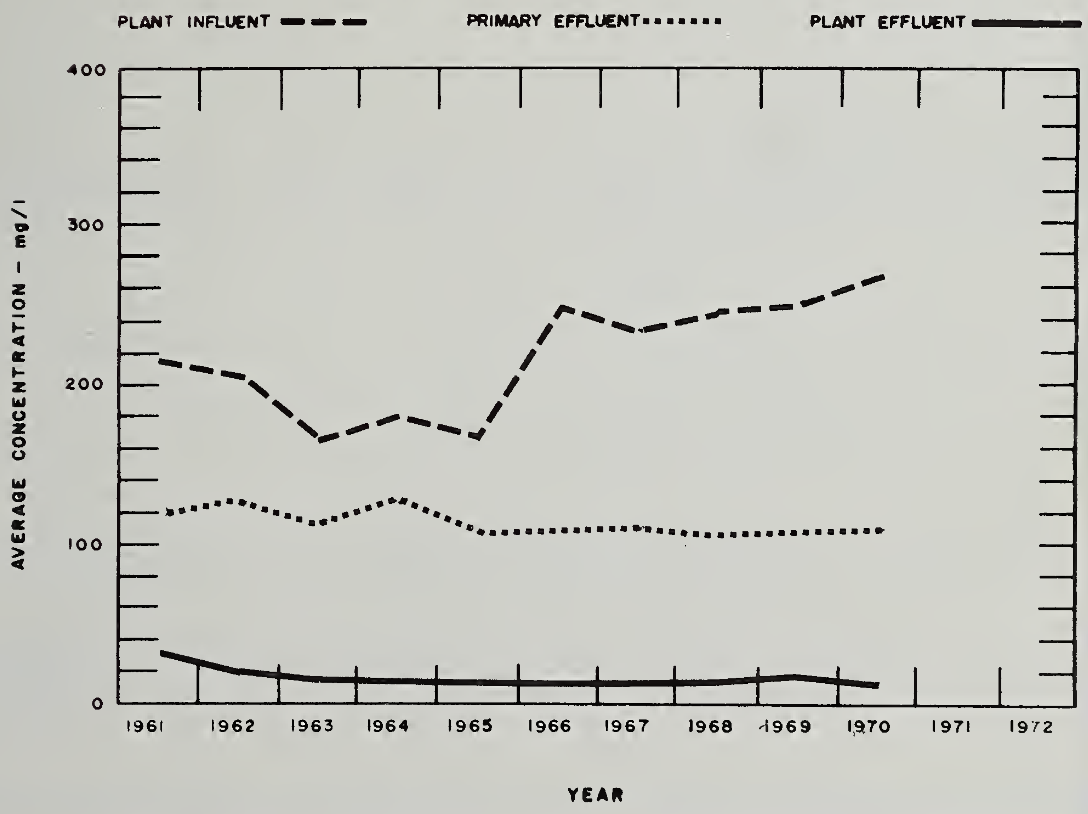
BIOCHEMICAL OXYGEN DEMAND

PLANT INFLUENT — — — PRIMARY EFFLUENT •••••• PLANT EFFLUENT ———





SUSPENDED SOLIDS



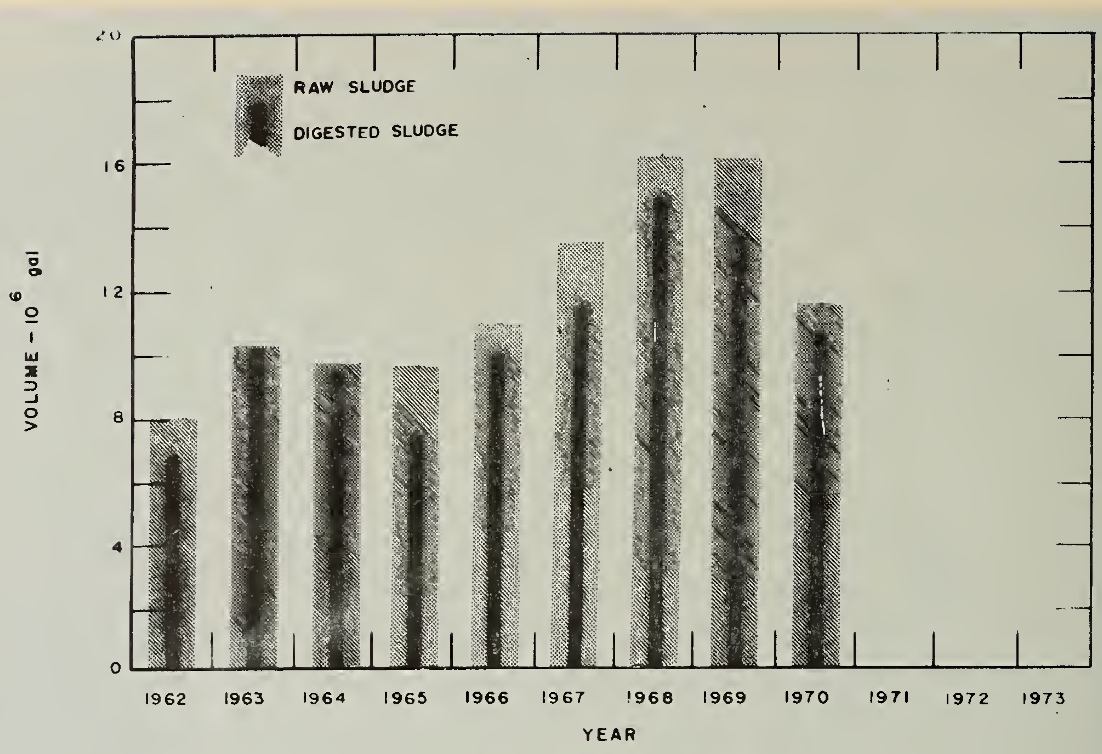
PLANT EFFICIENCY

MONTH	BIOCHEMICAL OXYGEN DEMAND						SUSPENDED SOLIDS						GRIT REMOVED
	INFLUENT		EFFLUENT		REDUCTION		INFLUENT		EFFLUENT		REDUCTION		
	n	mg/l	n	mg/l	%	10^5 pounds	n	mg/l	n	mg/l	%	10^5 pounds	cu ft
JAN	6	219	6	13	94	4.0	23	261	23	14	95	4.8	463
FEB	6	230	5	9	96	4.2	21	254	20	12	95	4.6	499
MAR	6	188	6	5	97	4.1	22	253	22	11	96	5.4	579
APR	7	163	7	5	97	3.9	24	232	24	11	95	5.4	489
MAY	4	184	4	5	97	4.3	19	279	19	13	95	6.4	594
JUNE	5	136	4	10	93	3.0	21	239	20	15	94	5.3	699
JULY	6	132	6	11	92	2.8	24	287	24	12	96	6.4	846
AUG	4	189	5	20	90	3.8	19	352	19	9	97	7.8	820
SEPT	7	156	7	13	92	3.4	23	270	21	14	95	6.1	1081
OCT	6	186	6	17	91	4.0	21	254	22	26	90	5.4	560
NOV	6	185	6	12	94	4.0	22	255	22	19	93	5.5	493
DEC	7	172	7	13	92	3.9	20	223	20	27	88	4.9	708
TOTAL	70	-	69	-	-	45.4	259	-	256	-	-	68.0	7831
AVERAGE	-	178	-	10	94	3.8	-	262	-	15	94	5.7	653

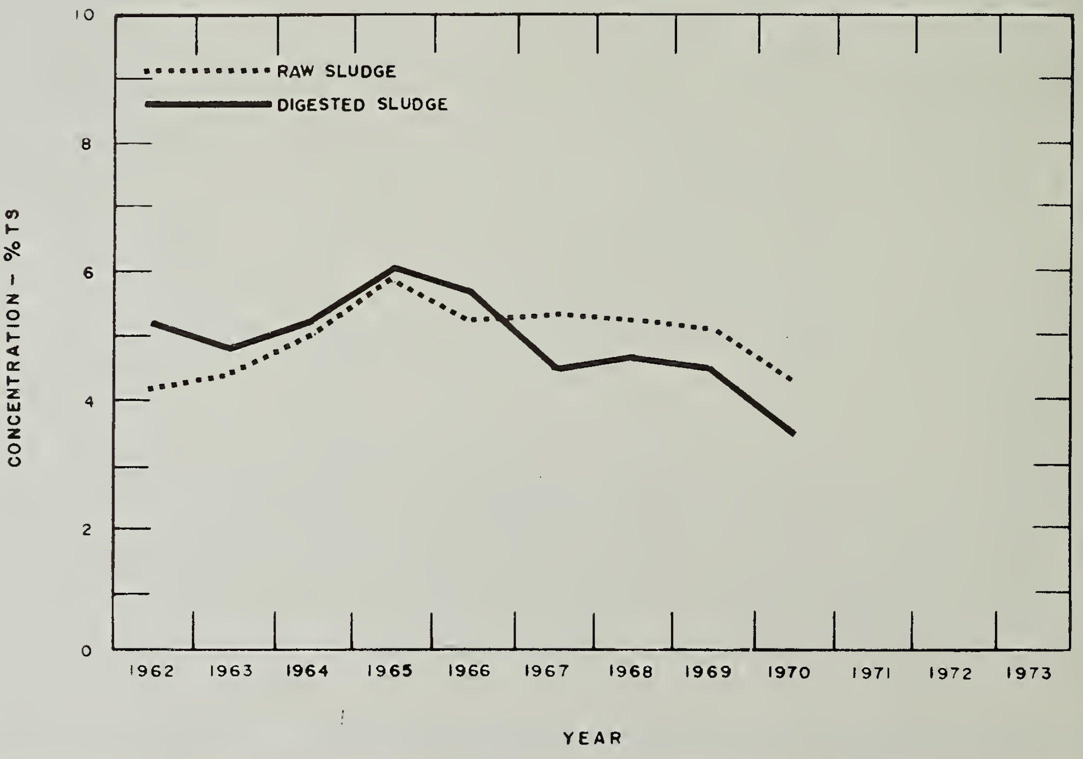
NOTE – n is the number of samples taken

AERATION

MONTH	AVG DAILY FLOW mil gal	AERATION INF.		SECONDY. EFF.		M L S S CONCN mg/l	F/M lb B O D / lb MLSS	AIR USED 1000 cu ft / lb B O D	WASTE SLUDGE 10^3 lb/day
		B O D mg/l	S S CONCN mg/l	B O D mg/l	S S CONCN mg/l				
JAN	6.3	154	82	13	14	2490	.12	1.3	-
FEB	6.8	154	108	9	12	2800	.11	1.2	-
MAR	7.2	145	112	5	11	2820	.11	1.1	-
APR	8.2	139	129	5	11	3260	.11	1.0	13
MAY	7.8	152	147	5	13	3570	.10	1.0	-
JUNE	7.9	110	113	10	15	3110	.9	1.4	-
JULY	7.5	101	119	11	12	2480	.9	1.7	-
AUG	7.4	92	92	20	9	1840	.11	2.1	-
SEPT	7.9	115	121	13	14	2330	.12	1.4	-
OCT	7.7	140	120	17	26	2540	.13	1.2	-
NOV	7.8	120	114	12	19	2750	.10	1.4	-
DEC	8.0	133	97	13	27	2350	.14	1.2	-
TOTAL	-	-	-	-	-	-	-	-	-
AVERAGE	7.5	130	113	10	15	2700	.11	1.3	13


RAW SLUDGE
DIGESTED SLUDGE
VOLUME – 10^6 gal
20
16
12
8
4
0
1962
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
YEAR

DIGESTION


RAW SLUDGE
DIGESTED SLUDGE
CONCENTRATION – % TS
10
8
6
4
2
0
1962
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
YEAR

SLUDGE DIGESTION and DISPOSAL

MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT		SLUDGE DISPOSAL	
	VOLUME 10^5 gal	TOTAL SOLIDS %	VOL SOLIDS %	VOLUME 10^5 gal	TOTAL SOLIDS %	VOL SOLIDS %	VOLUME 10 gal	TOTAL SOLIDS %	DEWATERED cu yd	LIQUID cu yd
JAN	8	4.7	78	9	3.1	67	-	-	-	5336
FEB	6	4.9	78	8	2.8	69	-	-	-	4653
MAR	9	4.8	77	8	3.4	67	-	-	-	4511
APR	9	4.7	61	5	3.4	65	-	-	-	2967
MAY	10	4.1	75	10	3.9	62	-	-	-	5733
JUNE	11	4.2	74	12	3.7	61	-	-	-	7241
JULY	12	4.1	73	11	3.5	64	-	-	-	6666
AUG	10	4.6	60	10	4.0	57	-	-	-	5672
SEPT	11	4.3	66	9	3.7	56	-	-	-	5068
OCT	11	3.9	72	8	3.1	61	-	-	-	4737
NOV	10	4.1	74	5	3.4	63	-	-	-	2958
DEC	10	4.2	75	11	3.7	64	-	-	-	6731
TOTAL	117	-	-	106	-	-	-	-	-	62273
AVERAGE	10	4.4	72	9	3.5	63	-	-	-	5189

Date Due

ONTARIO WATER RESOURCES COMMISSION
DIVISION OF PLANT OPERATIONS.

BRANTFORD 1970
OPERATING SUMMARY

TD227/B73/W37/1970/MOE

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